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ANALYTICAL METHODS REVIEW (U)

A Review of Ideas and Applications

August 1981

CONTENTS

Creativity and Intelligence Analysis (U) 1

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25X1

Is it possible for analysts to enhance their capability to conduct innovative intelligence analyses? In this article, [REDACTED] [REDACTED] who has been writing a series of articles on the psychology of intelligence analysis for the Office of Political Analysis, argues that creativity can be learned and provides some ideas on how analysts can improve their creative skills. (U)

25X1

This publication is produced by the Office of Political Analysis. Some issues contain articles drafted in other offices. Some articles are preliminary or speculative in nature, but the contents normally are coordinated as appropriate with other offices within CIA. Occasionally an article represents the views of a single analyst; these items are clearly designated as uncoordinated views.

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CREATIVITY AND INTELLIGENCE ANALYSIS¹ (U)

Creativity occurs when previously remote elements of thought suddenly become associated in a new and useful combination. Intelligence analysis is especially creative when it looks at old data in new ways and formulates new questions that may lead to whole new lines of research. A person's intelligence, as measured by IQ tests, has little to do with his or her creativity, but the organizational environment exercises a major influence. New ideas are most likely to arise in an organizational climate that nurtures their development and communication.

Conventional wisdom holds that creativity cannot be taught or developed; it is something one is simply born with. This is largely untrue. Many academic and commercial training programs are apparently successful in teaching people how to stimulate the flow of new ideas. These are based on several general principles and techniques, some of which are applicable to intelligence analysis. The most important is separation of the idea generation phase of analysis from the idea evaluation phase, and deferring evaluation until many alternative ideas have been thought of. The idea generation phase should be unconstrained, wide-ranging, optimistic. Idea evaluation should be critical and more narrowly focused. These two approaches do not mix well; when idea generation and evaluation are conducted concurrently, as is normally the case, creative ideas are often suppressed before they are even formulated. Group processes also play an important role in cross-fertilization of ideas during the idea generation stage. Optimal results come from alternating between individual thinking and group interaction. Several other procedures for stimulating creativity are also discussed in this article.

¹This article has not been coordinated with other offices within CIA.

PA AMR 81-003
August 1981

There is no universally accepted definition of creativity, although there is broad agreement that the concept is not limited to artistic creation. A mechanical process, an organizational structure, or an intelligence appraisal may be as creative, innovative, and original as a painting or a poem. Creativity implies the development of something unique through the formation of elements into new combinations. There is also an implication of usefulness or adaptation to reality, or at least the application of some critical standards, for otherwise highly novel, but erroneous, intelligence judgments would have to be considered creative. The unfortunate souls confined to mental institutions have many original thoughts, but these thoughts are not creative unless they meet some test of functional utility or artistic quality. Creative thinking requires "that one's ideas or responses be uncommon or atypical but, in addition, they must be recognized as somewhat better than the old, accustomed, typical response."²

J. Guilford's study of human intelligence distinguishes separate abilities for dealing with visual, auditory, symbolic, semantic, and behavioral information. Creativity in any one of these fields--say art or music--does not necessarily imply creative performance in any of the others.³ There may also be different abilities involved in the generation of new ideas than in their evaluation, development, or implementation. Creativity is clearly a multidimensional concept.

Within this broad framework, this article examines a number of specific questions dealing with creativity. In the context of an intelligence organization, what is the nature of a creative product? What is the process by which such products come into existence? What are the characteristics of a creative analyst? What conditions facilitate or stimulate creativity? And, given what is known about the processes, people, and circumstances that contribute to creativity, what can be done to enhance imaginative, innovative intelligence analysis?

²Morgan Worth, Aha! A Puzzle Approach to Creative Thinking (Chicago: Nelson Hall, 1975), p. 2.

³J. P. Guilford, "Creativity: A Quarter Century of Progress," in Irving A. Taylor and Jacob W. Getzels, eds., Perspectives in Creativity (Chicago: Aldine Publishing, 1975).

August 1981

The Creative Product

Imagination and creativity play important roles in intelligence analysis. Any estimate requires the ability to imagine possible outcomes of a current situation. These outcomes are not given; they are created by the analyst imagining a scenario that explicates how they might come about. Similarly, imagination and creativity are required to reconstruct how a problem looks from the viewpoint of a foreign government. Creativity is also required to question things that have long been taken for granted. The fact that apples fall from trees was well known to everyone; Newton's creative genius was to ask "why?". Intelligence analysts, too, must raise new questions that lead to the identification of previously unrecognized relations or to possible outcomes that had not previously been foreseen.

A creative intelligence product is one that shows a flair for devising original, imaginative, innovative--but also accurate and effective--ways to fulfill any of the major requirements of analysis: gathering information, analyzing data, documenting evidence, or presenting conclusions. Tapping unusual sources of data, asking new questions, applying unusual analytical methods, developing new types of products or new ways of fitting analysis to the needs of consumers are all examples of creative activity.

One of the most important criteria for judging the creativity of an analytical product is the amount of subsequent research or other activity it engenders. The most creative analysis leads to the identification and formulation of new questions that may lead to whole new lines of research, or to the development of new analytical procedures or methods that are broadly applicable to other analytical circumstances.

A new idea may be described as the product of a mental process that brings together into a close relationship two or more concepts or ideas not previously related to each other. Mednick described "the creative thinking process as the forming of associative elements into new combinations which either meet specified requirements or

August 1981

are in some way useful. The more mutually remote the elements of the new combination, the more creative the process or solution."⁴

The role of associations and combinations in creativity is perhaps best understood within the context of human memory, which supplies much of the raw material for the construction of new ideas. Like a library, computer data bank, or any other large information storage system, human long-term memory must have some organizational structure. Otherwise, it would be virtually impossible to retrieve information after it has been stored. The exact nature of this structure is uncertain, but it is useful to think of memory as a massive, multidimensional spider web. This image captures one of the most important properties of information stored in memory--its interconnectedness. It is possible to start at any one point in memory and follow a path to reach any other point. Information is retrieved by tracing through the network of interconnections to find the place where it is stored. Retrievability is influenced by the number and strength of pathways from this information to other concepts that might be activated by incoming stimuli. The more frequently a path is followed, the stronger that path becomes and the more readily available the information located along that path.

Following this same imagery, the act of creation may be envisaged as spinning new links in the spider web of memory, links between data or concepts that were not directly connected or only weakly connected before. Creative ideas result from the association of old elements into new combinations. When the linkage is made, the light dawns. This sudden insight has been termed the "Aha! effect."⁵

The ability to bring previously unrelated ideas together in meaningful ways is what marks the creative individual. This is the basis for a test designed to measure

⁴S. A. Mednick, "The Associative Basis of the Creative Process," Psychological Review, vol. 69 (1962), p. 221.

⁵Worthy, op. cit.

August 1981

creative ability, called the Remote Associates Test. Each question on the test consists of three words; the person taking the test is asked to think of a fourth word which can be linked to each of the three given words.⁶ For example:

Question: rat blue cottage Answer: cheese

The moment of creative insight may be sudden and brief, but the creative process as a whole is often quite protracted. Insight is usually preceded by prolonged searching. The new idea, or the solution to a difficult problem, is often found after one has taken a break or turned one's attention to other matters for a while.

Two major hypotheses have been advanced concerning the role and function of such an 'incubation period'. . . . One interprets the incubation period as permitting the operation of certain unconscious processes. The other interpretation conceives of the passage of time away from direct attention to the problem as permitting the 'unfreezing' of a fixated way of seeing the problem or its elements.⁷

Creativity is unpredictable and resistant to scheduling. We may experience the "Eureka, I've found it!" feeling while taking a shower or while in bed in the middle of the night, as well as at the office. Imagining creativity as resulting from the sudden association of previously unrelated elements helps to explain this. Much thinking is not under conscious control. The churnings of the subconscious result in a wider variety of associations than would ever be possible under conscious control, and some of these associations occasionally bubble to the surface to appear in conscious thought. They are most likely to appear at times when normal inhibitions holding the subconscious in check are relaxed.

⁶S. A. Mednick, Remote Associates Test (Ann Arbor, Mich.: University of Michigan Press, 1962).

⁷Donald W. MacKinnon, "IPAR's Contribution to the Conceptualization and Study of Creativity," in Irving A. Taylor and Jacob W. Getzels, eds., op. cit., p. 73.

August 1981

The Creative Person

There has been extensive research to identify the personal characteristics of people who are widely recognized as creative in their fields, or who score high on tests of creativity. This research has focused on the relationship between creativity and intelligence, and on the connection between creativity and various personality characteristics.

Many researchers have found little correlation between creativity and intelligence as measured by IQ tests. McNemar's experiments showed that among persons with high IQ levels there is great variation in creative ability, while at the lower IQ levels there is both far less variation and a generally lower level of creativity.⁸ This means that some minimum degree of intelligence is required for creativity, but that beyond that minimum level, having a higher IQ does not make one more likely to be creative.

In considering the relationship between creativity and intelligence, it is necessary to distinguish between intelligence as it is commonly measured by IQ tests and a much broader conception of intelligence. Guilford identified 120 factors of intellectual ability, many of which are not measured by the standard IQ tests. The factors that contribute to creativity are, according to Guilford, an important part of human intelligence, but they are, for the most part, among the many factors not included in the IQ tests.⁹

The intellectual abilities most important for creativity are what Guilford terms "divergent production" and "transformation." Divergent production is one of two possible ways of retrieving information from memory. It refers to a broad search of memory in response to an open-ended question for which there are a number of possible answers, as distinct from convergent production which is a focused search of memory when one particular answer is required. Divergent production of information from memory

⁸Q. McNemar, "Lost: Our Intelligence? Why?", American Psychologist, vol. 19 (1964), pp. 871-882.

⁹Guilford, op. cit.

August 1981

involves the ability to generate multiple hypotheses--to think of many possible causes of a given phenomenon, many ways in which an item of information may be relevant, many possible consequences of a new development, or many outcomes of a situation. Creative people generate more ideas to choose from, and this is the mental process Guilford refers to as divergent production.

The element of human intellectual ability Guilford calls transformation is the ability to change, redefine, or otherwise modify the objects of thought. This provides the flexibility needed for creative ideas. Transformations are often described with words such as shrinking, inverting, or reddening. Several checklists have been developed for use by product designers seeking new ideas. They are lists of ways in which an item might be transformed. Alex Osborn, in his well-known book Applied Imagination,¹⁰ put forth the following checklist: Put to other uses? Adapt? Modify? Magnify? Minify? Substitute? Rearrange? Reverse? Combine? Osborn's original list has a number of subquestions under each of these major headings. A product designer takes an existing product or idea and seeks to change it in each of these ways. This is a deliberate, conscious procedure to stimulate the imagination to make transformations that might not otherwise come to mind.

Briefly, transformation involves the ability to imagine things differently and to picture what the consequences of these differences might be. Sometimes, a creative solution depends upon transformation of the problem itself rather than a change in any single parameter.

Much thinking went into the mechanical design of various prototype tomato pickers before someone decided that the real problem was not in optimizing these designs but rather in the susceptibility of the tomatoes to damage during picking. The answer to the problem was a new plant, with tougher-skinned, more accessible fruit.¹¹

¹⁰Alex Osborn, Applied Imagination. Revised Edition (New York: Scribner's 1979), p. 318.

¹¹James L. Adams, Conceptual Blockbusting: A Guide to Better Ideas. Second Edition (New York: W. W. Norton, 1980), p. 23.

August 1981

In the context of intelligence analysis, transformation involves the ability to play with ideas, to avoid conceptual rigidity, and to ask "What if?" questions. What if certain variables were present or absent, stronger or weaker? What if the imputed cause were actually only an effect? What if a report we assume is true were actually untrue? What if what we thought was a strength (the Shah's authoritarian control) has developed into a weakness (corruption beyond the generally accepted bounds)? The analyst who ranks high on transformation ability will enjoy playing with these sorts of questions.

In terms of personal characteristics unrelated to intelligence, Guilford found that creative persons are more ready to take risks, less afraid of being wrong, and more willing to try out "long shots" than less creative individuals. The creative person is willing to accept what seem to be more remotely connected data as potentially relevant to a problem solution.¹² Creative individuals show independence, a need for autonomy, a tendency toward introversion, and a preference for working alone. They are often "very self-confident, self-reliant, even egotistical, and do not regard the approval or even the respect of others to be very important."¹³

These objectively measured traits are also reflected in people's own self-images. When asked to describe themselves, "highly creative persons stress their inventiveness, independence, individuality, enthusiasm, determination, and industry, while the less creative stress virtue, good character, rationality, and concern for others."¹⁴

The general theme of adventurousness, independence, and lack of concern for the approbation of others runs through all the research on the creative personality. Without such traits, creative ideas are likely to be suppressed at their inception, or at least not developed and implemented with the confidence and persistence required

¹²Guilford, op. cit., p. 43.

¹³Salvatore R. Maddi, "The Strenuousness of the Creative Life," in Irving A. Taylor and Jacob W. Getzels, eds., op. cit., p. 182.

¹⁴Donald W. MacKinnon, "The Highly Effective Individual," Teachers College Record, vol. 61 (1960), pp. 367-378.

August 1981

for them to gain acceptance. Creativity, especially in an organizational setting, disrupts the established order; it entails risks of rejection and of failure. Pursuit of such a course requires a special type of personality. Maddi concludes that "if we want to help persons be more creative, we should be toughening them up by encouraging self-confidence, a belief in their own greatness, and an imperviousness to social approval or rejection."¹⁵

Other characteristics related to creativity include strong theoretical and aesthetic interests. Creative individuals prefer complex and asymmetrical information to that which is simple and symmetrical. They have a greater perceptual openness, indicating a greater receptivity both to external experiences and to their own inner feelings and fantasies. They recognize that much of what we consider objective reality is so considered only on the basis of consensus, and is thus subject to question. MacKinnon interprets creative persons as

relatively uninterested in small details or in facts for their own sake, and more concerned with their meanings and implications, possessed of considerable cognitive flexibility, verbally skillful, interested in communicating with others and accurate in so doing, intellectually curious, and relatively disinterested in policing either own impulses and images or those of others.¹⁶

Organizational Factors Influencing Creativity

Having a new idea is not the end product of the creative process. Rather, it is but the beginning of what is sometimes a long and tortuous process of translating an idea into an innovative product. The idea must be developed, evaluated, communicated to others, and this process is influenced by the organizational setting in which it transpires. The potentially useful new idea must pass over a number of hurdles before it is embraced as an organizational product.

¹⁵Maddi, op. cit.

¹⁶Donald W. MacKinnon, "The Nature and Nurture of Creative Talent," American Psychologist, vol. 17 (1962), p. 490.

August 1981

This section describes in some detail research conducted by Frank Andrews to investigate the relationship between creative ability, organizational setting, and innovative research products.¹⁷ The subjects of this research were 115 scientists, each of whom had directed a research project dealing with social psychological aspects of disease. These scientists were given standardized tests of creative ability and intelligence. They were also asked to fill out an extensive questionnaire concerning the environment in which their research was conducted. A panel of judges composed of the leading scientists in the field of medical sociology was asked to evaluate the principal publication resulting from each of these 115 research projects.

The judges evaluated the research results on the basis of productivity and innovation. Productivity was defined as the "extent to which the research represents an addition to knowledge along established lines of research or as extensions of previous theory." Innovative-ness was defined as "additions to knowledge through new lines of research or the development of new theoretical statements of findings which were not explicit in previous theory."¹⁸ Innovation, in other words, involved raising new questions and developing new approaches to the acquisition of knowledge, as distinct from working productively within an already established framework. This same definition of innovation may be applied to distinguish innovation in intelligence analysis.

Andrews found virtually no relationship between the scientists' creative ability and the innovativeness of their research. (There was also virtually no relationship between level of intelligence and innovativeness.) Those who scored high in tests of creative ability did not necessarily receive high ratings from the judges evaluating the innovativeness of their work. One possible explanation is that creative ability or innovation, or both, were not measured accurately, but Andrews argues persuasively for another view. Various social and psychological factors have such an effect on the steps needed to translate

¹⁷Frank M. Andrews, "Social and Psychological Factors Which Influence the Creative Process," in Irving A. Taylor and Jacob W. Getzels, eds., op. cit.

¹⁸Ibid., p. 122.

August 1981

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creative ability into an innovative research product that there is no measurable effect traceable to creative ability alone. In order to document this conclusion, Andrews analyzed data from the questionnaires in which the scientists described their work environment.

It was observed that scientists possessing more creative ability produced more innovative work only under the following favorable conditions:

- When the scientist perceived himself or herself as responsible for initiating new activities. The opportunity for innovation, and the encouragement of it, are clearly important variables.
- When the scientist had considerable control over decisionmaking concerning his or her research program, in other words, freedom to set goals, hire research assistants, expend funds. Since a creative idea often requires some investigation and development before it can be developed into a creative product, people who are in positions to promote such development are more likely to be able to carry their ideas through to fruition.
- When the scientist felt secure and comfortable in his or her professional role. New ideas are often disruptive, and pursuing them involves risk of failure. People are more likely to advance new ideas if they feel secure in their position.
- When the scientist's administrative superior "stayed out of the way." A superior may have much to say about one's research goals and methods and the resources available.

August 1981

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Research is likely to be more innovative when the superior limits himself or herself to support and facilitation rather than direct involvement.

- When the project was relatively small with respect to number of people involved, budget, and duration. Small size promotes flexibility, and this in turn is more conducive to creativity.
- When the scientist engaged in other activities, such as teaching or administration, in addition to the research project. Other work may provide useful stimulation or help one to identify opportunities for developing or implementing new ideas. As was noted earlier, some time away from the task, or an incubation period, is generally recognized as part of the creative process.

The importance of any single one of these factors was not very great, but their impact was cumulative. The presence of all or most of these conditions exerted a strongly favorable influence on the creative process. Conversely, the absence of these conditions made it quite unlikely that even highly creative scientists could develop their new ideas into innovative research results. Under unfavorable conditions, the most creatively inclined scientists produced even less innovative work than their less imaginative colleagues, presumably because they experienced greater frustration with their work environment and this adversely affected their performance.

In summary, some degree of innate creative talent may be a necessary precondition for innovative work, but it is unlikely to be of much value unless the organizational environment in which that work gets done is such as to nurture the development and communication of new ideas. Under unfavorable circumstances, an individual's creative impulses probably find expression outside the organization.

August 1981

There are, of course, exceptions to this general rule. Some creativity occurs even in the face of intense opposition. A hostile environment can be stimulating, enlivening, and challenging. Some people gain satisfaction from viewing themselves as a lonely fighter in the wilderness, but when it comes to conflict between a large organization and a creative individual within it, the organization almost invariably wins.

Enhancing Creativity

Recognition of the role of organizational environment in stimulating or suppressing creativity points the way to one obvious set of measures to enhance creative organizational performance. Managers of analysis, from first echelon supervisors to the Director of Central Intelligence, must take steps that strengthen and broaden the perception among analysts that new ideas are welcome. This is not easy, for creativity implies criticism of that which already exists: it is, therefore, inherently disruptive of established ideas and organizational practices.

Particularly within an analyst's own office, the analyst must enjoy a sense of security, so that partially developed ideas may be expressed and bounced off others as sounding boards with minimal fear of criticism or ridicule for deviating from established orthodoxy. At its inception, a new idea is frail and vulnerable. It needs to be nurtured, developed, and tested in a protected environment before being exposed to the harsh reality of public criticism. It is the responsibility of an analyst's immediate supervisor and office colleagues to provide this protected environment.

In this section, however, we are primarily concerned with steps that can be taken by an individual analyst to increase his or her creativity irrespective of organizational environment or even one's own native talents. One cannot change one's genes, and the individual analyst generally cannot change the organizational environment. One must, nonetheless, assume personal responsibility for the product of one's analytical endeavors.

The old conventional wisdom that creativity is something one is born with, that it cannot be taught or developed, is largely untrue. While native talent, per se,

August 1981

may be unchangeable, it is possible to learn to employ one's innate talents more productively. With understanding, practice, and conscious effort, analysts can learn to produce more imaginative, innovative, creative work.

At least a half dozen different methods have been developed for teaching, facilitating, or liberating creative thinking. All the methods for teaching or facilitating creativity are based on the assumption that the process of thinking can be separated from the content of thought. One learns mental strategies that can be applied to different subjects.

All creativity techniques are concerned with stimulating the flow of ideas. There are no comparable techniques for determining which idea is best. The procedures are, therefore, aimed at the idea generation rather than idea evaluation. The same procedures do aid in evaluation, however, in the sense that ability to generate more alternatives helps one see more potential consequences, repercussions, and effects that any given idea or action might entail.

Creativity programs have been employed most extensively in industry in two fields with high payoff for innovative ideas: development of new products or improvement of existing ones, and development of advertising and marketing strategies. They have also been widely used to generate ideas for solving management problems. Specifically, such techniques were used to develop the Chiquita Banana advertising slogan, to invent a vapor-proof closure for space suits,¹⁹ and to obtain ideas for improving and increasing use of downtown bus service.²⁰

Problems of intelligence analysis are quite different, but many of the same procedures still apply. Intelligence analysts must generate ideas concerning potential causes or explanations of events, policies that might be pursued or actions taken by a foreign government, possible outcomes of an existing situation, or variables that will

¹⁹Morris I. Stein, Stimulating Creativity, vol. 2, Group Procedures (New York: Academic Press, 1975), p. 181.

²⁰Ibid., p. 53.

August 1981

influence which outcome actually comes to pass. Intelligence analysts also need help to jog them out of mental ruts, to stimulate their memories and imaginations, and to perceive familiar events from a new perspective. The techniques of creative thinking serve these functions.

It is not my intention to review commercially available programs for enhancing creativity. Such programatic approaches are more appropriately applied to problems of new product development, advertising, or management than to intelligence analysis. I will, however, discuss selected key principles and techniques that these programs have in common and that can be applied on an ad hoc basis by individual intelligence analysts or groups of analysts.

The principle of deferred judgment is undoubtedly the most important. Generation of ideas and judgment of these ideas should be two distinctly separate steps with judgment withheld until all possible ideas have been brought out. This is contrary to the normal procedure of thinking of ideas and evaluating them concurrently. Critical thinking and imaginative stimulation do not mix well. A judgmental attitude dampens the imagination, whether it be self-censorship of one's own ideas or fear of evaluation by colleagues or supervisors. Idea generation should be a freewheeling, unconstrained, uncritical process. New ideas are, by definition, unconventional, and therefore likely to be suppressed, either consciously or unconsciously, unless they are born in a secure and protected environment. Critical judgment should be suspended until after the idea generation stage of analysis has been completed. A series of ideas should be written down and then evaluated later. This applies equally to idea-searching by individuals as well as to group efforts.

A second principle is that quantity of ideas eventually leads to quality. This is based on the assumption that the first ideas that come to mind will be those that are most common or usual. It is necessary to run through these conventional ideas before arriving at original or different ones. People have habitual ways of dealing with problems, ways that they continue to use because they have proven successful in the past. It may well be that these habitual responses, the ones that come first to mind, are the best responses and that further search is unnecessary.

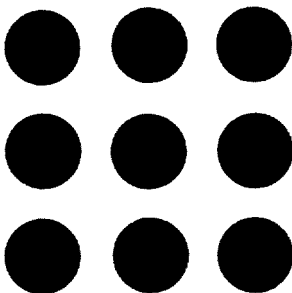
August 1981

If one is looking for new ideas, however, one should seek to generate as many ideas as possible before evaluating any of them.

A third principle is that thinking should be allowed--indeed encouraged--to range as freely as possible. It is necessary to free oneself from self-imposed constraints, whether these constraints stem from analytical habit, limited perspective, social norms, emotional blocks, or whatever. The inhibiting effect of self-imposed constraints, or "cages of the mind," is illustrated by the following puzzle.²¹

Without lifting pencil from paper, draw no more than four straight lines which will cross through all nine dots.

Figure 1



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After having tried to solve the puzzle on your own, refer to the appendix at the end of this article for answers and further discussion.

²¹The puzzle is from Adams, op. cit., pp. 24-29.

August 1981

The solutions described in the appendix do not come without effort. Intelligence analysis is limited by similar, unconscious, self-imposed constraints. It is necessary to make a conscious decision to unleash the imagination to range as widely as possible over possible alternatives. One has to want to be creative, and to be willing to work at it. At the idea generation stage, all ideas should be acceptable no matter how outrageous they may at first seem. Pursuant to the first and second principles discussed above, our well-practiced critical talents should be held in abeyance in order to permit emergence of the kinds of ideas needed to solve the problem. And we should seek as many ideas as possible in order to be able to select the best among them, rather than stopping at the first acceptable solution.

Yet another principle of creative problem solving is that cross-fertilization of ideas is important and necessary. Ideas should be combined with each other to form still further and better ideas. If creative thinking involves forging new links between previously unrelated or weakly related concepts, then creativity will be stimulated by any activity that brings more concepts into juxtaposition with each other in fresh ways. Interaction with other analysts is one basic mechanism for this. As a general rule, people generate more creative ideas when teamed up with others, as they help to build and develop each other's ideas. Personal interaction stimulates ability to make new associations between ideas; it also induces greater effort and helps maintain concentration on the task.

In commenting favorably on group processes, I am not thinking of the standard committee meeting. Most of us have heard the definition of a camel as a "horse designed by a committee." We are also familiar with coordination processes that force consensus based on the lowest common denominator of agreement. In encouraging group interaction, I am referring primarily to a brainstorming session with a goal of generating new ideas and in which, according to the first principles above, all criticism and evaluation are deferred until after the idea generation stage is completed.

Thinking things out alone also has its advantages, as individual thought tends to be more structured and

August 1981

systematic than interaction within a group. The optimum is to alternate between individual and team effort, using the group interaction to generate ideas that supplement individual thought. A heterogeneous group is clearly preferable to a homogeneous one. Some group participants should be analysts who are not close to the problem, for their ideas are more likely to reflect a new and different approach.

One technique that has helped people under many diverse circumstances to break through mental barriers is "externalization" of the variables, parameters, or elements that are critical to a problem. Key elements of a problem are put "out there," where they can be seen and experimented with, rather than keeping them in one's head. This involves making lists and drawing diagrams. When the key elements are on paper in some abbreviated form, it is far easier to manipulate these elements to examine the many alternatives available through rearranging, combining, or modifying them. Variables may be magnified or deleted, causal relationships reconceptualized, or conceptual categories redefined. Such thoughts may occur spontaneously, but they are more likely to occur if one takes explicit actions designed to encourage and facilitate such transformations.

Osborn observed that "for the purpose of moving our minds, pencils can serve as crowbars."²² He had in mind simple note-taking, which stimulates powers of association. It also applies to making lists. Adams advises that:

List-making is one of the simplest, most direct methods of increasing your conceptual ability. People often compile lists as memory aids. . . . However, lists are less frequently used as thinking aids. List-making is surprisingly powerful, as it utilizes the compulsive side of most of us in a way that makes us into extremely productive conceptualizers. . . . (Making lists ensures) that the ideas will last, since they are committed to paper. As we have already mentioned, ideas beget other ideas. If

²²Osborn, op. cit., p. 202.

August 1981

they are listed they will lie around for days
goading the idea-haver into other thoughts.²³

Lists made by a political intelligence analyst might include: all the possible outcomes of a situation, all the possible causes of a situation, factors a foreign leader must take into account when making a decision, all the reasons for and against a given judgment, and so forth. After compiling a list of all the variables expected to influence an outcome, one might then draw a simple arrow diagram showing how these variables relate to each other as well as to the outcome. Putting pencil to paper in this manner focuses the mind and can be a powerful stimulus to thought.

Role playing is another technique used to overcome constraints and inhibitions that limit the range of one's thinking. Playing a role gives one license to think and act like someone else. Simply trying to imagine how another leader or country will think and react, which analysts do all the time, is not role playing. One must actually act out the role and become, in a sense, like the person whose role is assumed. It is only actually "living" the role that breaks an analyst's normal mental set and permits one to relate facts and ideas to each other in ways that differ from habitual patterns. An analyst cannot be expected to do this alone; some group interaction is required, with different analysts playing different roles, usually in the context of an organized simulation or game.

Conclusions

Creativity, in the sense of new and useful ideas, is at least as important in intelligence analysis as in any other human endeavor. Procedures to enhance creativity are not new; they have been successfully employed by creative thinkers for many centuries. The only new elements, and even they are not very new anymore, are the grounding of these procedures in psychological theory to explain how and why they work, and their formalization in systematic creativity programs.

²³Adams, op. cit., pp. 107 and 117.

August 1981

Learning creative problem-solving techniques does not change one's native-born talents, but it does help one achieve his or her full creative potential. Most people have the ability to be more creative than they themselves realize. The effectiveness of these procedures depends, in large measure, upon the individual analyst's motivation, drive, and perseverance in the quest for new ideas. A questioning attitude is prerequisite to any successful search for new ideas. Any analyst who is confident that he or she already knows the answer, and that this answer has not changed recently, is unlikely to produce innovative or imaginative analysis. Another prerequisite to creativity is sufficient strength of character to suggest new ideas to others, possibly at the expense of being rejected or even ridiculed on occasion. "The ideas of creative people often lead them into direct conflict with the trends of their time, and they need the courage to be able to stand alone."²⁴

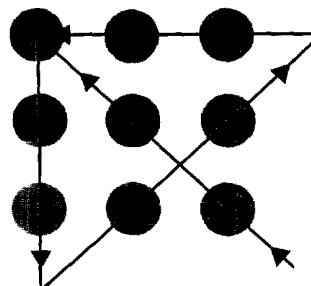
The above article is Unclassified.

²⁴Robin Hogarth, Judgement and Choice (New York: John Wiley, 1980), p. 117.

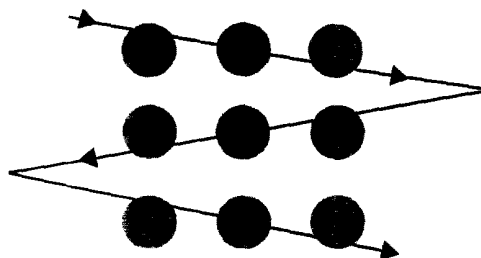
August 1981

Appendix

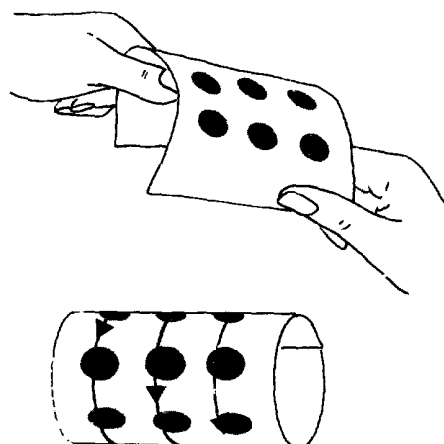
This puzzle is difficult to solve only if one delimits the problem too narrowly. A surprising number of people assume that they are not supposed to let the pencil go outside an imaginary square drawn around the nine dots. This unconscious constraint exists only in the mind of the problem-solver, for it is not specified in the definition of the problem. With no limit on the length of lines, it should be relatively easy to come up with the answer.



Another common, unconscious constraint is the assumption that the lines must pass through the center of the dots. This constraint, too, exists only in the mind of the problem-solver. Without it, the three-line solution at right becomes rather obvious.



A more subtle and certainly more pervasive mental block is the assumption that such problems must be solved within a two-dimensional plane. By rolling the paper to form a cylinder, it becomes possible to draw a single straight line that spirals through all nine dots.



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August 1981

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